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| 09/516,171 | 02/29/2000 | Mark Burton | Q58064 | 1951 |

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Sughrue Mion Zinn Macpeak & Seas
2100 Pennsylvania Avenue NW
Washington, DC 20037-3202

EXAMINER

HA, DAC V

| ART UNIT | PAPER NUMBER |
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2634

DATE MAILED: 07/02/2003

4

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/516,171

Applicant(s)

BURTON, MARK

Examiner

Dac V. Ha

Art Unit

2634

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 29 February 2000.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-11 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-11 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 3.
- 4) ☐ Interview Summary (PTO-413) Paper No(s) _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

| | | | |
|-----------------------------------|---------------------------------------|--|-------------|
| Notice of References Cited | Application/Control No. 09/516,171 | Applicant(s)/Patent Under Reexamination BURTON, MARK | |
| | Examiner Dac V. Ha | Art Unit 2634 | Page 1 of 1 |

U.S. PATENT DOCUMENTS

| * | | Document Number Country Code-Number-Kind Code | Date MM-YYYY | Name | Classification |
|---|---|--|-----------------|----------------------------|----------------|
| | A | US-5,090,028 | 02-1992 | Crebouw, Jean-Luc | 375/354 |
| | B | US-5,960,048 | 09-1999 | Haartsen, Jacobus Cornelis | 375/366 |
| | C | US-5,727,018 | 03-1998 | Wolf et al. | 375/149 |
| | D | US-4,930,140 | 05-1990 | Cripps et al. | 370/342 |
| | E | US-5,479,444 | 12-1995 | Malkamaki et al. | 375/231 |
| | F | US-5,838,672 | 11-1998 | Ranta, Jukka Tapio | 370/335 |
| | G | US- | | | |
| | H | US- | | | |
| | I | US- | | | |
| | J | US- | | | |
| | K | US- | | | |
| | L | US- | | | |
| | M | US- | | | |

FOREIGN PATENT DOCUMENTS

| * | | Document Number Country Code-Number-Kind Code | Date MM-YYYY | Country | Name | Classification |
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NON-PATENT DOCUMENTS

| * | | Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages) |
|---|---|---|
| | U | |
| | V | |
| | W | |
| | X | |

*A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(a).)
Dates in MM-YYYY format are publication dates. Classifications may be US or foreign.

DETAILED ACTION

Claim Objections

1. **Claims 1-11** are objected to because of the following informalities:

Claim 1, lined 8, the recitation "correlating received training sequence" should be changed to "correlating a received training sequence".

Appropriate correction is required.

Specification

2. The disclosure is objected to because of the following informalities: the page number on the bottom of the first page of the Specification is missing.

Appropriate correction is required.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. **Claims 1, 2, 7, 8, 10, 11** are rejected under 35 U.S.C. 103(a) as being unpatentable over the admitted prior art (Instant application, Figure 1; page 1, line 9 to page 2, line 20) in view of Crebouw (US 5,090,028).

Regarding claim 1, the admitted prior art (Instant application, on page 1, line 9 to page 2, line 20; Figure 1) teaches the following claimed subject matter.

"detecting a frequency correction burst by scanning of a wanted channel;" (Figure 1, element 401)

"providing time and frequency synchronizations by using said frequency correction burst;" (Figure 1, element 402)

"receiving a synchronization burst;" (Figure 1, element 403)

"equalizing the received synchronous burst;" (Figure 1, element 404)

"providing time and frequency synchronizations again by using said corrected frequency correction burst" (Figure 1, element 405)

The admitted prior art differs from the claimed invention in that it does not teach the claimed subject matter "cross correlating received training sequence contained in said synchronous burst with a selected subset of an expected training sequence to obtain a channel estimate; deriving a frequency error estimate from said channel estimate; correcting the frequency error of the received burst in accordance with said frequency error estimate".

The attention is now directed to Crebouw's patent. Crebouw discloses a Method Of And Apparatus For Synchronization By Means Of Correlation, which suggests the teaching of the claimed subject matter "cross correlating received training sequence contained in said synchronous burst with a selected subset of an expected training sequence to obtain a channel estimate; deriving a frequency error estimate from said channel estimate; correcting the frequency error of the received burst in accordance with said frequency error estimate" as followed.

Crebouw suggests the teaching of the claimed subject matter “cross correlating received training sequence contained in said synchronous burst with a selected subset of an expected training sequence to obtain a channel estimate” in that, the sync data, which is formatted into frame and transmitted to the receiver, includes synchronization sequence, SQ, which is known to and stored at the receiver (Figure 2; Col. 1, line 50; Col. 2, lines 12-14; Figure 3, element 60; Col. 3, lines 22-24). The synchronization sequence, SQ, thus teaches the “training sequence contained in said synchronous burst”. The known SQ is divided into parts and the selected part is correlated with the SQ in the received data (Col. 3, lines 24-29). The correlation results thus produce the “channel estimate” (Col. 3, lines 30-32).

Crebouw further suggests the teaching of the claimed subject matter “deriving a frequency error estimate from said channel estimate; correcting the frequency error of the received burst in accordance with said frequency error estimate” in that, the correlation results are processed by element 66 of Figure 3 to produce output 68. Therefore, the output 68 teaches “a frequency error estimate”. The output 68 from the error calculator is utilized to correct the frequency shift from the received data (Figure 5, element 80). As a result, the total correlation of the received data (Figures 3, 5, elements 72, 74) will be effected under advantageous conditions because the frequency shift has already been corrected (Col. 4, lines 6-14).

In summary, Crebouw discloses a method for utilizing the partial correlation results for correcting the received data (Figure 1, elements 50, 25) before performing

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the equalization on the received signal (Figure 1, element 29) so that equalization could be performed on the corrected data (Col. 5, lines 28-29).

Therefore, it would have been obvious to a person of ordinary skill in the art at the time of the invention to incorporate the technique of correlating parts of the known synchronization sequence stored at the receiver with the received data, then utilizing such correlation results for correcting the frequency shift of the received data, as taught by Crebouw, into the admitted prior art teaching of synchronization, particularly between the step of correlating the received training sequence with the expected training sequence (Figure 1, element 403) and the step of equalization (Figure 1, element 404), to provide the benefit of accurately obtaining synchronization between the transmitter and receiver since the frequency shift, which may be caused by Doppler effect (Col. 3, lines 4-8), has been corrected before performing total correlation. And further, equalization could be performed on the corrected data (Col. 5, lines 28-29), thus improving the quality of the final output of the received signal.

Regarding claim 2, the combination of the admitted prior art and Crebouw's patent teaches the claimed subject matter in claim 2, as applied to claim 1 above. Further, the admitted prior art suggests the teaching of the claimed subject matter "wherein the received training sequence is part of the signal within a synchronization burst transmitted by a base station of a cellular telephone network" in the instant application on page 1, line 19 to page 2, line 2. That is, as indicated above (page 4, paragraph 1), the combination of the admitted prior art and Crebouw's patent teaches "the received training sequence is part of the signal within a synchronization burst". The

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admitted prior art, on page 1, line 19 to page 2, line 2, teaches that the mobile terminal synchronizes with the base station transmission via a broadcast control channel, which is transmitted by the base station.

Regarding claim 7, the combination of the admitted prior art and Crebouw's patent teaches the claimed subject matter in claim 7, as applied to claim 1 above. Crebouw further suggests the teaching of the claimed subject matter "wherein the selected subset is an adaptive subset" in that, the SQ could be divided into 8 parts (Figure 3, elements 60; Col. 3, lines 22-23) or two parts (Figure 6, element 60'; Col. 4, lines 64-65).

Regarding claim 10, the combination of the admitted prior art and Crebouw's patent teaches the claimed subject matter in claim 10, as applied to claim 1 above. Crebouw further suggests the teaching of the claimed subject matter "wherein the frequency error estimate is obtained by a Doppler tracking phase locked loop" as followed. The "frequency error estimate" (Figure 3, element 68) is subsequently utilized to correct the frequency shift in the received data of the next period (Col. 4, lines 6-14; Figure 7; Col. 5, lines 19-26). This "frequency error estimate" is utilized to consequently produce a final error (Figure 1, element 44; Col. 4, lines 4, lines 60-62) to use as part of the loop for tracking the frequency differences, which may be caused by Doppler effect (Figure 1, elements 44, 46, 20; Col. 3, lines 1-9).

Regarding claim 8, the combination of the admitted prior art and Crebouw's patent teaches the claimed subject matter in claim 8, as applied to claim 2 above. Crebouw further suggests the teaching of the claimed subject matter "wherein the

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selected subset is an adaptive subset" in that, the SQ could be divided into 8 parts (Figure 3, elements 60; Col. 3, lines 22-23) or two parts (Figure 6, element 60; Col. 4, lines 64-65).

Regarding claim 11, the combination of the admitted prior art and Crebouw's patent teaches the claimed subject matter in claim 11, as applied to claim 2 above. Crebouw further suggests the teaching of the claimed subject matter "wherein the frequency error estimate is obtained by a Doppler tracking phase locked loop" as followed. The "frequency error estimate" (Figure 3, element 68) is subsequently utilized to correct the frequency shift in the received data of the next period (Col. 4, lines 6-14; Figure 7; Col. 5, lines 19-26). This "frequency error estimate" is utilized to consequently produce a final error (Figure 1, element 44; Col. 4, lines 4, lines 60-62) for use as part of the loop for tracking the frequency differences, which may be caused by Doppler effect (Figure 1, elements 44, 46, 20; Col. 3, lines 1-9).

5. **Claims 3, 4** are rejected under 35 U.S.C. 103(a) as being unpatentable over admitted prior art in view of Crebouw as applied to claim 2 above, and further in view of Ranta (US 5,838,672).

Regarding claim 3, the combination of the admitted prior art and Crebouw's patent teaches the claimed subject matter in claim 3, as applied to claim 2 above, except for the claimed subject matter "wherein the received training sequence is the 64 bit training sequence of the GSM system".

The attention is now directed to Ranta's patent. Particularly, Ranta teaches the claimed subject matter "the received training sequence is the 64 bit training sequence of the GSM system" in Col. 1, lines 42-45; Col. 2, lines 26-28; Figure 1.

In the same field of endeavor, Ranta discloses a method for measuring the timing of a received signal. More particularly, the measurement is achieved by correlating the training sequences transmitted from the base station to the mobile station in the GSM system with the training sequence at the mobile station (Col. 2, lines 26-28; Col. 3, lines 17-25; Col. 4, lines 6-8).

Therefore, a person of ordinary skill in the art at the time of the invention would have motivated to modify the synchronization sequence, SQ, as taught in the combination of the admitted prior art and Crebouw, to include "the 64 bit training sequence of the GSM system" to provide a synchronization burst compatible with, i.e. GSM system, so that the advantage of the frequency shift being corrected before equalization, as taught the combination of the admitted prior art and Crebouw, could be exploited for such application as GSM system since GSM is becoming more and more common today.

Regarding claim 4, the combination of the admitted prior art, Crebouw and Ranta patents teaches the claimed subject matter in claim 4, as applied to claim 3 above, except for the claimed subject matter "wherein the selected subset comprises the 21st through 44th symbols of the training sequence".

Ranta teaches that the training sequence is the 64 bit training sequence of the GSM system. The training sequence is contained in the synchronization burst (Figure

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1). Crebouw teaches that the "training sequence" (SQ) could be divided into 8 parts (Figure 3, element 60) merely as an illustration. A person of ordinary skill in the art would have recognized that the "training sequence" (SQ) could have been divided into any number of parts. The purpose of the synchronization burst is to synchronize the mobile station to the frame structure of the base station (Ranta, Col. 1, lines 49-51). This includes time and frequency. Under the condition of noise and/or interference, to achieve the best result of the correlation with the received signal, a middle part of the training sequence would have provided the best estimate of time and frequency. That is, in estimating the time and frequency, the time is shifted one way or another, thus the middle part of the training sequence is most likely to be correctly detected for frequency than that at or closer to the boundary of the training sequence. As a result, the middle part could have comprised "the 21st through 44th symbols of the training sequence", which would be the optimum for frequency estimate.

Therefore, it would have been obvious to a person of ordinary skill in the art at the time of the invention to divide the training sequence, taught by the combination of the admitted prior art, Crebouw and Ranta patents, into, for example 3 or 5 parts, so that the correlation of the middle part of the training sequence with the received signal would ensure the best estimate of the frequency detection use for synchronization. Thus, the accuracy and the speed of the synchronization detection are improved.

6. **Claim 5** is rejected under 35 U.S.C. 103(a) as being unpatentable over the admitted prior art in view of Crebouw as applied to claim 1 above, and further in view of Malkamaki et al. (US 5,479,444) (hereinafter Malkamaki).

Regarding claim 5, the combination of the admitted prior art and Crebouw's patent teaches the claimed subject matter in claim 5, as applied to claim 1 above, except for the claimed subject matter "wherein the training sequence is an adaptive training sequence"

The attention is now directed to Malkamaki's patent. Malkamaki discloses a Training Sequence In Digital Cellular Radio Telephone System, which teaches the claimed subject matter "the training sequence is an adaptive training sequence" in that the training sequence is used for calculation of the impulse response of the channel. The training sequence is advantageously made adaptive so as to enhance the quality of the connection (Abstract; Col. 3, lines 59-62; Col. 4, lines 16-29).

The combination of the admitted prior art and Crebouw's patent utilizes the synchronization sequence (or synchronization burst) for combating the fluctuation and disturbance from the channel (Crebouw, Col. 2, lines 6-10) and/or channel estimation (Instant application, page 2, lines 3-4).

Therefore, it would have been obvious to a person of ordinary skill in the art at the time of the invention to incorporate the use of "an adaptive training sequence" taught by Malkamaki into the synchronization sequence (SQ) of the combination of the admitted prior art and Crebouw's patent so as to make the synchronization sequence adaptive. As a result, the system can be adaptive to vary from situation to situation (i.e. in city areas where multiple path propagation of a signal is dominating versus in the countryside) such that a better and faster estimate of the channel can be made.

7. **Claims 6, 9** are rejected under 35 U.S.C. 103(a) as being unpatentable over the admitted prior art in view of Crebouw as applied to claim 2 above, and further in view of Malkamaki.

Regarding claim 6, the combination of the admitted prior art and Crebouw's patent teaches the claimed subject matter in claim 6, as applied to claim 2 above, except for the claimed subject matter "wherein the training sequence is an adaptive training sequence"

The attention is now directed to Malkamaki's patent. Malkamaki discloses a Training Sequence In Digital Cellular Radio Telephone System, which teaches the claimed subject matter "the training sequence is an adaptive training sequence" in that the training sequence is used for calculation of the impulse response of the channel. The training sequence is advantageously made adaptive so as to enhance the quality of the connection (Abstract; Col. 3, lines 59-62; Col. 4, lines 16-29).

The combination of the admitted prior art and Crebouw's patent utilizes the synchronization sequence (or synchronization burst) for combating the fluctuation and disturbance from the channel (Crebouw, Col. 2, lines 6-10) and/or channel estimation (Instant application, page 2, lines 3-4).

Therefore, it would have been obvious to a person of ordinary skill in the art at the time of the invention to incorporate the use of "an adaptive training sequence" taught by Malkamaki into the synchronization sequence (SQ) of the combination of the admitted prior art and Crebouw's patent so as to make the synchronization sequence adaptive. As a result, the system can be adaptive to vary from situation to situation (i.e.

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in city areas, where multiple path propagation of a signal is dominating, versus in the countryside) such that a better and faster estimate of the channel can be made.

Regarding claim 9, the combination of the admitted prior art and Crebouw's patent and Malkamaki's patent teach the claimed subject matter in claim 9, as applied to claim 6 above. Crebouw further suggests the teaching of the claimed subject matter "wherein the selected subset is an adaptive subset" in that, the SQ could be divided into 8 parts (Figure 3, elements 60; Col. 3, lines 22-23) or two parts (Figure 6, element 60; Col. 4, lines 64-65).

Conclusion

8. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Haartsen (US 5,960,048) discloses a Method And An Arrangement For Receiving A Symbol Sequence.

Wolf et al. (US 5,727,018) disclose a Process For Obtaining A Signal Indicating A Synchronization Error Between A Pseudo-Random Signal Sequence From A Transmitter And A Reference Pseudo-Random Signal Sequence From A Receiver.

Cripps et al. (US 4,930,140) disclose a Code Division Multiplex System Using Selectable Length Spreading Code Sequences.


Any inquiry concerning this communication or earlier communications from the examiner should be directed to Dac V. Ha whose telephone number is 703-306-5536.

The examiner can normally be reached on 5/4.

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Stephen Chin can be reached on 703-305-4714. The fax phone numbers for the organization where this application or proceeding is assigned are 703-872-9314 for regular communications and 703-746-5813 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 305-5500.

A handwritten signature in black ink, appearing to read "Dac V. Ha", written over a horizontal line.

Dac V. Ha
Examiner
Art Unit 2634

DH
June 27, 2003